the producer and gas conduit at its highest point (/>) — to an arm of a U tube, which is filled with gas of 0'3 kilogramme per cubic metre, whilst the other equally tall arm contains air at the ordinary temperature. The arrangement is sketched in Fig. 2. The length of the arms of the U tube — that is to say, the height from the fire to the highest point 6, the centre of the gas conduit — is 9 metres, and the arm (db) which contains the gas, is closed at (6) by an elastic medium ; whilst the arm (&i&i), filled with cold air, is open at the top, whilst at (&) and (bi) the same pressure of air (p) is at work.

There is then the pressure which is exercised on an area of 1 square metre at (ai) on the column of air (a-i&i), equal to (p) + weight of 9 cubic metres of air ; and as 1 cubic metre of air weighs 1*2937 kilogramme one obtains —

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Pressure at (ai)=p+9 x 1-2937=^+1 1-G4 Pressure at («)=/->+ weight of the gas coluimi (ab)

_ Difference of pressure S-94

This difference of pressure is termed buoyancy. In the above case a value of 8*9 kilogrammes per square metre has been arrived at, which, as 1 cubic metre of water weighs 1,000 kilogrammes, is equivalent to the pressure of a column of water 8*9 millimetres in height. In consequence of the buoyancy of the gas in question, when a connection with the outer air is produced at (6), a movement of the gas results and air streams into the tube as fast as the gas contained in (ab) can stream out.

The gas is conducted to the open-hearth furnaces from the producers by means of conduits, by which it is passed downwards to the regenerator chambers, therein rising again to the ports, and during the entire way undergoing changes of temperature. One may regard the course of the gas as occurring in a system of communicating tubes, and if one knows the relative heights of the individual arms of the tubes and also the mean temperatures ruling therein, one can calculate the buoyancy of the gas at which it is forced upon its entrance into the furnace proper, i.e., combustion chamber.